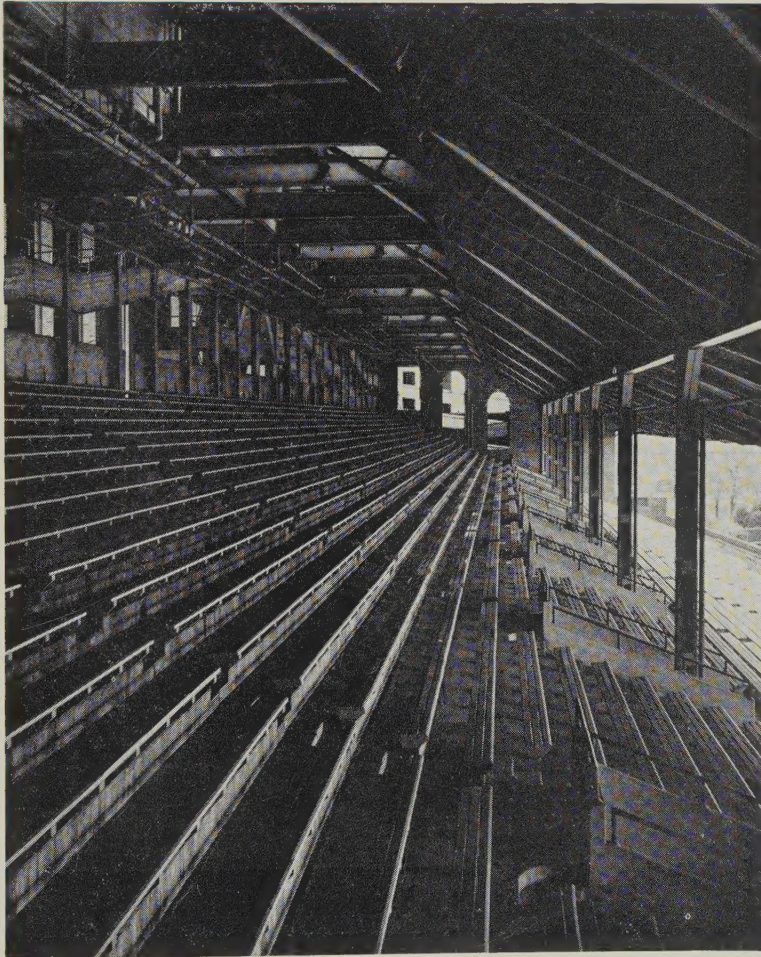


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the **ILLINOIS ENGINEER**



STADIUM

Photo by C. Dale Greffe

THE ILLINOIS ENGINEER, JANUARY, 1957—VOLUME XXXIII, NO. 1

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Of Interest to I. S. P. E.

Vox Secretarii

By P. E. ROBERTS, *Executive Secretary*

72nd Annual Meeting

Details of the program for the 72nd Annual Meeting are rapidly crystalizing. Chicago Chapter President-elect John Duba reports that a tentative program will be ready for publication in the February issue. Many details for the entertainment and education of the members of the Illinois Society have been made. Special emphasis has been placed on the ladies' entertainment.

Chapter Officers' Conference

The Board of Direction fixed the date of February 2 and the Executive Committee has named the Pere Marquette Hotel in Peoria as the place for the Ninth Annual Chapter Officers' Conference. The first one of these meetings was held in Springfield in January, 1949 to solve some membership problems. The work of the annual conference has gradually changed so that in recent years it has been an indoctrination type of conference for new Chapter officers. Many Chapter problems have been discussed and it is surprising how many new ideas have been developed from the discussion of Chapter problems. Chapter officers should consider this a MUST and members of Chapters should urge their new Chapter officers to attend the meeting in Peoria on February 2. It is interesting to note that National Society has recognized the value of such a conference of Chapter officers and is urging that state societies consider such a program.

Happy New Year

In retrospect, the Society had a good 1956 and with the added interest in membership which developed during the past year, total membership records can be broken during 1957. Financially the Society is in good shape and your officers look forward to 1957 with enthusiasm and confidence. The help and cooperation of every person belonging to the Illinois Society is always welcome. May you face the New Year with like confidence and enthusiasm.

COVER PICTURE

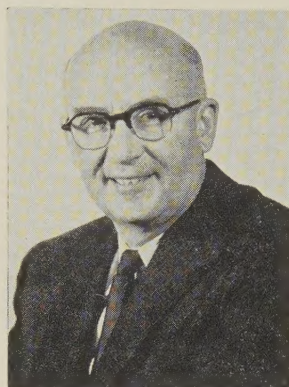
The picture on the cover titled "Stadium" is an unusual picture in that very few people see a Stadium without people. The view is under the balcony in the West Main Stands of the University of Illinois Stadium. Professor C. Dale Greffe took it and the print has been "hung" in several salons.

72nd ANNUAL MEETING
HOTEL SHERMAN
APRIL 11, 12, and 13

New Year Greetings

By ROYCE E. JOHNSON, *President*

A Happy and Prosperous New Year is a greeting which each ISPE member would send all fellow members in this first month of 1957. Probably the "Happy New Year" part of each greeting would have different connotations if the potential greeters thought about its significance, especially for that part of the year beginning on January 2nd.



President Johnson

What does the usual New Year's greeting mean when expressed by professional men? What do doctors, lawyers, ministers, teachers, scientists and engineers have in mind as their concepts of "Happy"? Are their concepts the same for fellow professionals as for other professional men or for laymen? What constitutes happiness (or being professional)? Can happiness be earned, purchased, imagined, retained or even attained?

One might expect the vast majority of people to be perennially happy in this age of mechanical servants, continuously available electro-magnetically transmitted aural and visual entertainment, fossil fuel heated houses and pharmaceutically maintained health and beauty. Why should we not be relatively much happier than our

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recent predecessors for whom tranquilizers and sleep inducers were unnecessary after their twelve-hour work days? On the practical intellectual side, magazines and books by the hundred-weight on how to succeed in business, cards, love, etc., or how to relax, think creatively or live sanely, really ought to keep us out of the doldrums of unhappiness. And yet it seems that a growing proportion of our people appear to be happy only when determinedly pursuing what they hope will be a "good time." No doubt the grass always will appear greener on the other side of the fence.

Reflection on the questions in the second paragraph would, I believe, lead many engineers to agree that their considered concept of a Happy New Year for a fellow engineer is one in which he has:

Health for his family and himself,

Sufficient socially useful, remunerative work of an engineering nature to keep him well occupied,

Reasonable time and income for family, religious, social, civic, technical and professional society activities,

Adequate needs and ambitions to motivate him and strength to accomplish them,

Enough difficult problems, frustrations and challenges to keep him in prime condition as a successful professional engineer.

Such is the nature of the Happy and Prosperous New Year I wish for each and all of our members.

**72nd ANNUAL MEETING
HOTEL SHERMAN
APRIL 11, 12, and 13**

THREE TIME WINNER

Mr. Donald S. Magowan received a distinction that will probably not be received by any other member of the Illinois Society for many years to come. In December Mr. Magowan was elected President of the DuKane Chapter for the year of 1957. When he takes office "Mac" will become the only member of the Illinois Society to have served as President of three different Chapters. In 1948, when he was with the Highway Department in Chicago, he was President of the Chicago Chapter. Later the Illinois Division of Highways moved him to Springfield and he served as President of the Capital Chapter in the year of 1953. In the fall of 1955 "Mac" was moved to Elgin to become District Engineer of Number 1 District. Heartly congratulations to Mr. Magowan for his many years of service to the Illinois Society and his continued interest and activity.

**72nd ANNUAL MEETING
HOTEL SHERMAN
APRIL 11, 12, and 13**

**72nd ANNUAL MEETING
HOTEL SHERMAN
APRIL 11, 12, and 13**

**Report of the National Director of the Board of
Directors' Meeting Held in White Sulphur
Springs, October 24-27, 1956**

by W. Wayne Wallace, Director

The West Virginia Society of Professional Engineers was host for the meeting of the directors of the National Society of Professional Engineers at the Greenbrier, White Sulphur Springs, October 24-27. Thirty nine state chapters and the District of Columbia were represented. This meeting, the first your representative has had the opportunity to attend, was most impressive.

Several of the committee reports were quite long; some were controversial. Nevertheless, all of them received close attention. I was impressed with the sincerity of the committee chairmen in making these reports, the comments of the directors and particularly with the great amount of work involved by the committees and the officers of the society in assembling, editing and disseminating the results of their work. The minutes of this meeting are not yet available; therefore, my report will touch only on the highlights.

The one committee report which developed the most discussion was that of the committee on federal policy for engineering education. The Board of Directors agreed that education, particularly at the collegiate level, is strictly up to local government. However, the Board endorsed steps to encourage students in the upper 25 per cent of their high school class to attend college. The Board also supported motions to provide better instructors in the fields of mathematics and science as well as the development and expansion of educational programs of technical institutions where courses are at the post-high school level. Financial support through allocation of federal funds to students not having received their bachelor's degree was opposed.

In regard to professional concepts in engineering the Board encouraged:

- Chapters to sponsor high school engineers clubs;
- Colleges to place more emphasis on professionalism—either through courses or lectures;
- State societies to work more actively with college engineering students who are forming student chapters of the state societies;
- More extensive work with young engineers following graduation.

Rules of government and operation for the newly formed functional section for consulting engineers in private practice were approved. The Board also approved designation of one of its vice presidents as liaison officer to the section so that both section and NSPE activities may be coordinated. The task forces assigned

(Continued on page 5)

Science: Blessing or Curse?

by Dr. Leland H. Carlson, President of Rockford College

Basically, the word *science* means knowledge.

The Latin verb *scio*, which you learned in high school, has the form *sciens* in the present participle, which we translate as "knowing."

Science is organized knowledge; it is systematic information wrought into a coherent whole; it is a kind of classified index to the pages of sense impression.

Therefore, it is a mistake to deify or reify science, to make a god or to make a thing out of what is an organized system of thought. The old fear of hell has been supplanted by the modern fear of being unscientific.

I should like to think of science as an attitude of mind, as a spirit of loving truth with all our intelligence, and of loving God with all our heart. Science is a method of approach to the study of nature. It involves a collection of data, their classification, the formulation of a hypothesis, further testing and experimentation, and then complete verification.

There are at least two types of science. One is the formal kind, such as logic, or mathematics, or mechanics. This type is a kind of intellectual procedure for ascertaining knowledge. Mathematics represents the sharp growing edge of man's most accurate thought, but it is not reality. It is a key, a necessary aid to other kinds of work. Basically, it is a means to an end.

The second type of science is empirical. This kind is more than intellectual, because it involves an experimental study of data. Such disciplines as botany and geology, physics and chemistry, biology and zoology, involve a working with materials in nature.

Science has several functions. One is the ascertaining of the facts. A great scientist of the 16th century, Thomas Huxley, said that we ought to sit down before a fact as though we were a little child and let the fact lead us where it would. It is tragic to see the destruction of a big theory by a little fact, but we must be ruthless in pursuing the truth.

Science has the task of analysis. This involves the asking of the question—how? The how of life is important, but it is not the most important thing. The man who knows how will always have a job, but the man who knows why will be his boss.

The capacity to know both the how and the why of a thing is a rare ability. I once saw in a factory a sign

which read: "From the neck down, you are worth \$1.50 a day. From the neck up, it's up to you."

Science is subject to limitations. It is obvious to anybody who thinks that knowledge is not the same as wisdom. The world has progressed in knowledge, in science, in medicine, and in the use of inventions. Perhaps we have not advanced as far in wisdom. There is a great gap between science and its utilization. Too often the pearls of science have been cast before the swine. Science has annihilated distance by the invention of the airplane. With what result? The airplane is a potential destroyer of civilization. Science invents; brute force sits at the controls.

A second limitation of science is that it constitutes a two-way process. It is like a two-edged sword that cuts for good or for ill, depending on how it is used. World War II was more intense and fiendish than preceding wars, thanks to scientific men. Science alone is insufficient because it may be a potential blessing or a terrible curse.

A third limitation of science is that it is built on assumption. Philosophy questions its own assumptions, and criticizes its own criteria. A science such as Euclidian geometry is built on nine axioms. Concepts such as cause and effect, space and time, are taken for granted. The existence of the objective world is not questioned, and the intelligibility of the universe is assumed. Likewise, the capability and accuracy of the human mind are assumptions easy to make. These may be true assumptions, but they do involve an element of faith.

As I look into the future, I believe I can foresee several trends which science will take. One significant direction will be toward increased service. Great changes in the past have revealed to us how significant scientific and industrial progress can be.

Have you ever realized that the great revolutions in history have been silent ones?

Certainly, the Puritan, the American, the French and the Russian revolutions were of great impact. Nevertheless, their influence has not been so significant as the quiet silent revolutions, which have altered the course of civilization.

The man who learned to control fire, the person who discovered gunpowder, the individual who invented the compass, the team of men that made possible the printing press, the inventors of the telegraph and telephone, the radio and television—all these people have made possible a second scientific revolution and a new industrial evolution. Perhaps we are living right now in a period of a third scientific and industrial revolution without realizing that these quiet silent changes are upon us.

A second pronounced trend of science is toward a spirit of greater humility.

EDITOR'S NOTE: The accompanying article by Dr. Leland H. Carlson first appeared in the *Rockford Register-Republic* on November 22, 1956. The newspaper generously permitted the ILLINOIS ENGINEER to use Dr. Carlson's article.

It is of particular interest at this time for the reason that Dr. Carlson will address the members of the Illinois Society at the Annual Banquet Friday, April 12, on another subject. The ILLINOIS ENGINEER thanks both Dr. Carlson and the *Rockford Register-Republic* for their cooperation.

If you will read the works of Haeckel, of Faraday, of Spencer, and of Huxley, you will note a spirit of confidence, sometimes even cocky and dogmatic. But today we know too much about matter to be materialists. The work of Professor Rutherford and Professor Bohr has given us a new insight into the nature of matter. We do not think of matter as something hard, unyielding, absolute, in terms of 19th century physics, but rather as energy, waves of radiation.

Take the gram of radium which American scientists presented to Madame Curie. It is shooting off every second three inferent discharges of electric energy.

1. Every second it is bombarding surrounding space with 145,000 billion alpha particles, or helium atoms, moving at 12,000 miles per second, or twelve thousand times the speed of the Big Bertha projectiles in the late war.

2. It is pouring out like a machine gun 71,000 billion lighter beta particles, or electrons, at ten times greater speed than the alpha particles, at a velocity of almost 186,000 miles, or about seven times around the earth, in a second.

3. It is pouring forth gamma waves, like those used in radio, only of shorter wave-length, at the rate of thirty billions per second. The first particles shoot right through glass and through hundreds of thousands of other atoms unhindered, showing that all these atoms from hydrogen to lead are mostly empty space. It is the energy of the electricity that makes them seem hard and solid.

The attitudes toward the mechanistic concepts have greatly changed. Space may be curved; time may be considered as mental sequence. The past is present memory; the future is present anticipation; therefore we live in an eternal NOW.

In the 19th century length was somewhat fixed and unalterable. Today, because of the work of Einstein, the idea of relativity is commonly accepted.

Let us use an example. I have a bar of iron which is one foot long and weighs one pound. Let us assume that I moved it one foot from the east to the west. A simple event, you say?

When I moved the bar of iron one foot to the west, the earth was spinning 1,400 feet to the east. Perhaps it would be more correct to say that the bar of iron moved 1,399 feet to the east. At the same time, the earth was moving around the sun at the rate of 98,000 feet per second. Within the bar itself, each electron moved about 7,000,000 feet per second. The problem of describing what happened when the bar of iron was moved one foot becomes less simple.

Assume that we take the bar of iron into an airplane and speed it up to 161,000 miles. The bar shrinks to one-half of its length and doubles its weight. If we could increase the speed to 186,300 miles, the length begins to disappear.

The developments in evolution, in materialism, in mechanism, in the new books of physics—all indicate an attitude of great humility, more questioning, a sense of wondering, and a spirit of modesty.

One other trend which is observable is that science is heading toward philosophy and religion.

Scientists are becoming philosophers and are even discussing theology. Men such as Arthur H. Compton, R. A. Millikan, Sir James Jeans and Sir Arthur Eddington have contributed to the field of philosophy and religion as well as to science itself.

The great philosophical and religious attitudes are clearly seen in a statement made by Sir James Jeans, in his book, *The Mysterious Universe*: "Today there is a widespread agreement, which on the physical side of science amounts almost to a unanimity, that the stream of knowledge is heading towards a non-mechanical reality. The universe begins to look more like a great thought than like a great machine. Mind no longer appears as an accidental intruder into the realm of matter."

Science can become the greatest boon to mankind. Let us do all in our power to see that the scientist, who pilots the plane, is a man of clear vision, broad purposes, and deep understanding. In this task our liberal arts colleges can be of enormous help.

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National Directors' Report (Continued)

to investigate problems in such areas as fees, professional liability insurance and ethical practices put in a great deal of work in developing the material submitted in this report.

Being the current chairman of the Chicago Chapter's Engineers' Week Committee, I was particularly interested in the report of the Engineers' Week Committee. The theme for the 1957 observance February 17-23 is "Engineering . . . America's Great Resource." All of the chapters have received the promotion kits. We were privileged to see a new 29-minute film, "American Engineer," produced by the Jam Handy Organization in Detroit. I recommend its use during Engineers' Week.

The Board received a report on two court cases involving interpretation of professional provisions of the Taft-Hartley Act. The cases involved engineers at the Jersey City and Buffalo plants of Westinghouse who sought respectively decertification from the Electrical Workers Union and a test of the doctrine of the National Labor Relations Board that may include non-professional employees with professionals in voting rights.

Our own Chicago Chapter member, Linas Brown, presented a report on the subcommittee "Engineers in the Employ of Private Practitioners."

The spring meeting of the Board of Directors of the NSPE will be held February 15-16 in Charleston, South Carolina. It is expected that considerable discussion will develop regarding the proposed ideal registration law. A report on rules of ethical conduct also is expected to highlight the meeting. Your director expects to attend this meeting.

NEWS FROM THE CHAPTERS

Capital Chapter held its December meeting at the Elks Club in Springfield on December 27. The first order of business was electing 1957 Chapter officers. Dean Collins is President; Herb Brantley, Vice President; C. A. Nelson, Secretary, and C. R. Ihlenfeldt, Treasurer. Besides the election of officers, a discussion of the 1957 Legislative Dinner was held, followed by a fellowship and egg nog party.

The Chapter had the pleasure of seeing Past President Klassen's new slides from the South Pacific area at their November meeting.

Central Illinois Chapter held its December meeting at the Elks Club in Decatur. The following officers were elected:

President—J. Parke Boyer

Vice President—Gilbert D. Henning

Chapter Representative (73)—Dr. Herman W. Dorn

Chapter Representative (74)—John E. Housiaux

After a short recess, program chairman Byron Toney introduced some gentlemen from the Permacel Tape Corporation who presented a program on pressure sensitive tapes.

Champaign County Chapter held its December meeting on the 7th at Paradise Inn south of Champaign. This was the official visit of President Royce E. Johnson, who gave an informative address to the Chapter on the professional activity of the State Society during the past year and an outline of NSPE's program for 1957. A straw vote was taken on the question of fluoridation of water and it was voted to devote the January meeting to a panel discussion of this problem.

Chicago Chapter held its December meeting on the 13th at the Chicago Engineers Club. The election of officers was by mail vote. The program was by Mr. Evert C. Johnson, partner of Arthur Anderson & Company, Certified Public Accountants, who talked on the subject "Depreciation—Current Regulations and Choice of Methods." The January meeting was the Third Annual Banquet of the Chicago Chapter and was held in the Walnut Room of the Bismarek Hotel. Principal speaker at the banquet was Mr. Garvin H. Dyer, Vice President of NSPE. George DeMent was toastmaster.

Illinois Valley Chapter's November meeting was held in the meeting room of the Monarch Electric and Supply Company in LaSalle. President Chamlin reported that he had written to all the Illinois Society Chapters urging their support of the proposed changes in the Cities and Villages Act requiring that City Engineers be registered professional engineers before being qualified for office. Also, to give better continuity, a motion was duly made and passed that members of the Engineers' Week Committee be appointed for three-year terms, two new members being appointed each year. The program was put on by Westelox, who presented a film on the manufacture of clocks.

Peoriarea Chapter held its November meeting on the 13th in the Illinois Room, Wigwam, Bradley University. President Landes named a nominating committee for the 1957 Chapter Officers. He also announced the names of the Engineers' Week Committee and the Refresher Course Committee. Following the business meeting Mr. Harry L. McKee, Chief Operational Analyst of McDonald Aircraft Corporation, St. Louis, Missouri, spoke on "Operations Analysis."

Obituaries**Clifford M. Hathaway**

Clifford M. Hathaway (N '50-'54) died on December 11 at the age of 72.

Mr. Hathaway was Chief Highway Engineer, State of Illinois Division of Highways, from 1949 to 1951.

In the late 1920's Mr. Hathaway was a member of the Illinois Society of Engineers. In the December, 1929 issue of the *Illinois Engineer* he wrote an article titled "Some Interesting Phases of Illinois Road Work." His title at that time was Engineer of Construction, Illinois State Highway Department.

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DuKane Chapter held its November meeting on November 15 at the Eagles Lodge in Elgin. The nominating committee presented the following slate of officers:

President—D. S. Magowan

Vice President—Robert Starke

Secretary-Treasurer—J. J. Fast

Chapter Representative—R. S. Thornton

The program was introduced by Secretary John Fast. Mr. Fred Wells, who is a member of the DuKane Chapter, gave a talk on his recent tour to various military installations in the United States.

Joliet Chapter held its Annual Meeting in the Candlelight at Joliet on December 10, and reports the election of the following officers:

President—Robert A. Brown

Vice President—Howard A. Hassert

Secretary—Bernard Anderhous

Treasurer—James Gates

A discussion led by William Gray was had on the proposed merger of the Illinois Association of Highway Engineers and the Illinois Society.

The most difficult thing to set to music is a boy at the piano with his pals waiting outside.—*Evelyn Hood.*

Newly-appointed vice president (one of seven) was given a lengthy lecture on his duties by the chairman of a large Midwest corporation. "Do you now understand what your new job calls for?" asked the chairman. "Yessir," said the new vice-president, "if you make a mistake I cheerfully take the blame."—*Collier's.*

**72nd ANNUAL MEETING
HOTEL SHERMAN
APRIL 11, 12, and 13**

Light Weight Diesel-Opposed Piston Engine

The greatest possibility for reducing the size and weight of diesel engines for marine and railroad uses is offered by a highly super-charged two-cycle engine compounded with a turbine driving an axial flow compressor. The cylinder layout which offers the greatest potentiality for such development is the "opposed piston" design.

These are the conclusions of the chief engineer of the Piston Engine Division, D. Napier & Son Ltd., Ernest Chatterton. Mr. Chatterton presented a paper on engines best suited to such development today, at the 1956 annual meeting of The American Society of Mechanical Engineers.

An interesting solution of the problem, the Napier "Deltic" engine, has opposed piston cylinders arranged in a triangle with crank shafts at the three corners. Mr. Chatterton declared that this arrangement overcomes most of the technical objections to the opposed piston layout. Furthermore, the space in the center of the delta may be used for an axial flow compressor, making the complete compound engine compact. This engine weighs about 2½ lb. per BHP for an output of 550 BHP.

Apart from space and weight savings which are important in ships and locomotives, a reduction in over-all maintenance costs was reported to be derived from the use of small engines. This is obtainable by adopting the "repair by replacement system" which permits saving in skilled engineering service and avoidance of loss of serviceability time with its economic penalties. Even a complete change of engines is possible within a few hours.

Mr. Chatterton presented extensive engineering data in support of his contentions that the development of the high-speed diesel is justified on both technical and economic grounds. They covered practical speed limits, three types of engine, air supply, fuel efficiency, utilization of heat and distribution of temperatures, and power output per unit volume of cylinder.

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I hold every man a debtor to his profession;
from the which as men of course do seek to re-
ceive countenance and profit, so ought they of
duty to endeavor themselves by way of amends
to be a help and ornament thereunto.

Sir Francis Bacon

Engineering Societies Personnel Service, Inc.

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8 W. 40th	84 E. Randolph	100 Farnsworth	57 Post St.

EDITOR'S NOTE: The following men available and positions available listed below by the Engineering Societies Personnel Service, Inc., is run again in January.

The Executive Committee has asked that the Board of Direction make a study of the problem of whether to continue with Engineering Societies Personnel Service or discontinue it. The Board will take up the question on January 19.

For the above reasons, the publication of this material in this issue should not be taken to mean that a decision has been made on the renewal of the contract. The action of the Board will be relayed to you in the February issue.

PLACEMENT FEES: The service is operated on a co-operative basis, whereby those actually placed in positions by the Service pay a fee in accordance with the established placement fee rates, which is 4% of the annual salary to members and 5% of the annual salary to non-members. HOWEVER, MANY EMPLOYERS EITHER PAY FULL PLACEMENT FEE OR NEGOTIATE FEES.

MEN AVAILABLE

Manufacturing Mgr. (textiles or light assembly). 50. M.A. chem. enrg. Background in textile and dielectric fields; new product developments; training and exp. in business admin. \$7200, dep. on loc., Chgo. preferred. 778-IE

Chief Arch. Field or Constr. Engr. Bldgs. 42. 3 yrs. college, 4 yrs. arch.; reg. architect 5 yrs. field constr. exp.; 3 yrs. office structural des. exp.; 10 yrs. office architectural design working dwgs., specs., contracts, etc. \$10,000 min. Overseas or S. W. 771-IE

Sales Engrg. Mgmt. or Admin. 32. B.S., E.E., Purdue; district sales mgr. 8 yrs. exp. selling and organizing sales force, elec., mech. industrial eqpt. to OEM accounts. Heavy travel in New England, N.Y.C., Chgo. and central Midwest. Desires position with growing organization. \$10,000. N.Y.C. or Chgo. 776-IE

Geologist (mining or petroleum). 27. B.S., Geol. 4 plus yrs. exam. and evaluation of mineral deposits, petroleum, metallic and non-metallic; prep. of reports, maps and financial data; extensive trav.; famil. with coal prep., strip mining and quarrying; lab. quality control exploration drilling. \$7,000. 775-IE

Chief Elect. Engr. (mining, petroleum-aviation). 32. B.S., E.E. Prepare estimate drawings, designs, specifications for all new mines and beneficiating plants; supv. field work of elect. and assist in major trouble shooting; supv. maint. of elect. eqpt., negotiate with engr. contractors and outside design firms. \$8000 plus. U. S. 774-IE

Chief Engr. (Textile or chem.) 46. M.S., E.E. Prep. of layouts for new installations, selection of eqpt., estimating cost, prep. request for capital approp. and supv. construct.; also make recommend. for maint. existing eqpt. \$7200 773-IE

Resident Engr. (construction). 37. B.S., C.E. Supv. civil and constr. sections of plant enrg.; all civil design except struct. and surveys. \$9,000. West-Foreign. 772-IE

Industrial Mgmt. Engr. 34. B.S., M.E. 8 yrs. exp. in all phases of industrial enrg. with special emphasis on budgetary control systems; supervisory exp. \$12,000. Chgo. 768-IE

Chief Engr. (chem.). 40. B.S.-Chem. E. Worked on lab. pilot plant and prod. plant phases of penicillin and streptomycin prod.

Worked on design and procurement of indust. instrumentation and control eqpt. for projects in chem. and plastics fields \$11,000. Midwest-South. 771-IE

Chief Engr. (mining). 50. B.S., E.E. 20 plus yrs. complete chge. of elect. dept. oper. and maint. of hydro and diesel generating stations, substations, transmission system and elect. eqpt. for five-bucket type gold and platinum dredges. \$10,000. 770-IE

Plant Mgr., Works Mgr., Gen. Mgr. (foundry and mach.) 45fl B.S. 20 yrs. managerial exp. all phases of foundry work incl. design, estimating and sales; have excellent record in production, machiner and assembly; can oper. for control and lowering costs. \$18,000. Midwest. 769-IE

Mfg. Mgmt. 31. M.S., Chem.E., B.B.A. 9 yrs. successful record in applying imagination, effort and judgment in solving mfg., enrg., and human relations problems. \$11,000. 767-IE

Resident Engr. (constr. of mining plants). 32. B.S. min. engr., exp. in constr. mining plants, liaison between subcontractors, field forces and the contractors' field forces. \$175 wk. U. S. 765-IE

POSITIONS AVAILABLE

Design or Project Engr. B.S., E.E. or M.E. Age 22-40; 0-2 plus yrs. pref. exp. test., dev., des., or application; know electro-mech. control syst. for continuous operation. Duties: Oppor. to head up the design and devel. group. Oppor. will be provided for acquiring exp. for appl. who have too little. For a mfr. of elect-mech. controls. Sal. \$5500 to \$9000. Loc. Ill. Emp. will pay the fee. C-5484

Struct. Designer. B.S., C.E., or Arch. E. Age 28 up. 3 yrs. in enrg. office with sim. duties; know des. and drftg. Duties: Struct. design of steel, concrete and timber for ind. bldgs., checking of struct., shop dwgs.; some struct. drftg.; approx. 60% struct. des., 40% drftg. For a mfr. of paints. Sal. \$700 mo. Loc. Chgo. Empl. will pay the fee. C-5626

Office Engr. Grad. C.E. Age up to 35. 2 plus yrs. in highway work either field or office. Duties: Office enrg., gathering and compiling data on highway and concrete technology. Able to write clear reports; some trav. For a trade assoc. Sal. up to \$7500. Loc. Chgo. Empl. will pay the fee. C-5737

Village Engr. Grad. C.E. 3 plus yrs. in municipal or bldg. constr. or design. Duties: Depending on background will be appointed either as supt. of public works or as vil. engr. Up to \$8000. Loc. N. W. Chgo. sub-urb. Empl. will pay the fee. C-5718

Dir. of Research. Grad. Chem. or Chem. E. Age, about 40; 5 plus yrs. in top-level research; knowl. of bldg. products desirable. Duties: To head up research dept. in bldg. products field; must be leader and able to take complete charge of research group. Sal. \$15,000-\$20,000. Loc. Chgo. Empl. will pay the fee. C-5766

Research and Devel. Engrs. Grad. Engr. 1-10 yrs. exp. electronic tubes; know electron tubes (cathode ray, dark trace, gas-filled, power, miniature). Explore and devel. uses, design and construct prototypes, etc. For a mfr. Sal. \$500 up. Loc. Ill. Empl. will negotiate fee. C-5855

Designers Struct. B.S., C.E. 2 plus yrs. exp. Duties: Designing and detailing all types of bridges for small consulting firm doing work on a national basis. Exceptionally good fringe benefits. Sal. open. Loc. Mo. Empl. will pay the fee. C-5890

Designers-Struct. Grad. or equiv. 3 plus yrs. exp. Duties: Struct. design on industrial bldgs. and mach'y. supports; will do design and own drftg. About 50% board work. Sal. open, dep. on exp. Loc. Chgo. Empl. will pay the fee. C-5891

Tech. Asst. to V.P. of Mfg. B.S., M.E. Age 30-40; 8-10 yrs. exp. mfg. production enrg. production control; know mfg. methods and procedures, tooling, machinery, etc. Duties: Deal with technical aspects of mfg. problems and make recommendations for their solution; study appl. of latest production methods, tooling and eqpt.; suggest ways and means to improve existing methods and facilities; examine ways and means to reduce costs in collaboration with production control, production enrg., product enrg., purchasing methods, etc. For a mfr. of heavy and med. weight machinery. Sal. \$10,000-\$15,000. Loc. Chgo. Empl. will pay the fee. C-5899

Designer. B.S., M.E. Age 25-30 or 50-55. 3 yrs. exp. design of indust. fume control and indust. air cond. Duties: Design fume control systems for chem. processes; dust-collecting systems; industrial air cond. systems. Sal. \$500-\$650. Loc. No. Shore Suburb. C-5907